

Remarks

Claims 15, 18 and 23 have been amended. New claims 28-40 have been added.

The amendments to claims 15, 18 and 23 restrict the recited polyimide binder resin to a tetracarboxylic acid component and an aromatic diamine component by replacing the "consisting essentially of" language with "consisting of."

New claims 28-40 mirror claims 15-27 except that the recited polyimide binder resin comprises a tetracarboxylic acid component and an aromatic diamine component and is not crosslinked. Support for these amendments can be found in Applicants' specification at, for example, page 4, lines 10-14 and page 7, lines 7-35. No new matter has been introduced by any of the amendments. After entry of the amendments, claims 15-40 will be pending.

1. Examiner Telephonic Interview

On January 31, 2005, the undersigned and the Examiner discussed whether the Examiner would consider the claims to be in a condition for allowance if the recited polyimide binder resin of claims 15, 18 and 23 were restricted to consisting of a tetracarboxylic acid component and an aromatic diamine component. The Examiner stated that such an amendment would require an additional search of the prior art and suggested that Applicants maintain the currently pending claims with their "consistently essentially of" language and add a separate set of claims employing the proposed "consisting of" language. These comments are summarized in the Examiner Interview Summary mailed February 3, 2005.

2. Rejection Under 35 U.S.C. § 102(b) / § 103(a): Yamamoto

The rejection of claims 15-17, 23 and 26 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 5,260,412 to Yamamoto *et al.* ("*Yamamoto*") is maintained. According to the Examiner, the transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials or steps and those that do not materially affect the basic and novel characteristics of the claimed invention. The Examiner asserts that the burden is therefore upon Applicants to show that in this particular case, the argued lack of crosslinking of Applicants' polyimide resins does materially affect the basic and novel characteristics of the invention. Otherwise, the Examiner states that

the "consisting essentially of" language of claims 15, 18 and 23 will be interpreted as equivalent to "comprising" language.

To iterate the arguments related to crosslinking submitted by Applicants in the previously filed response, the oligomer compositions described in *Yamamoto* are obtained by heat curing a combination of a terminal-modified imide oligomer (A) with an unsaturated imide compound (B) (see col. 2, lines 45-64).

The terminal-modified imide oligomer (A) of *Yamamoto* is described as being formed by reaction of three components: a biphenyltetracarboxylic acid component, an aromatic diamine component and a monoamine component having a carbon-carbon triple bond (see col. 3 of *Yamamoto*, lines 4-9). As such, the terminal-modified oligomer (A) contains a polymerizable triple bond moiety at its terminus and at least one imide bond within the main chain (see col. 3, lines 14-21).

The unsaturated imide compound (B) is described as being formed by reaction of a substituent-containing nadic anhydride with a monoamine having a carbon-carbon triple bond (see col. 5, lines 30-35). As such, the unsaturated imide compound (B) also contains, similar to the terminal-modified oligomer (A), a polymerizable triple bond moiety at its terminus and at least one imide bond within the compound (see col. 5, lines 36-40).

The carbon-carbon triple bonds present at the termini of the imide oligomer (A) and the unsaturated imide (B) form a crosslinking aromatic ring during heat curing through a trimerization reaction and the nadic imide groups on (B) also crosslink. Thus, the oligomer compositions described in *Yamamoto* are highly crosslinked. Such crosslinked oligomers exhibit high heat resistance but are also rigid and non-thermoplastic.

In contrast, the polyimides claimed by Applicants possess substantially different physical properties in that, at the very least, they (a) do not have crosslinked structures and (b) are thermoplastic. As currently amended, claims 15, 18 and 23 restrict the components of the recited polyimide, through the use of "consisting of" language, to a tetracarboxylic acid component and an aromatic diamine component. Unlike the (A) and (B) components of the oligomers described by *Yamamoto*, these components do not contain the modified termini such as carbon-carbon triple bonds or nadic imides group within the chain that allow crosslinking to occur. The non-crosslinked polyimides claimed by Applicants are therefore structurally distinguishable from the

crosslinked oligomers described by *Yamamoto* and would have different physicochemical properties such as, for example, tensile strength and breaking elongation. Further, there is no teaching or suggestion in *Yamamoto* of non-crosslinked oligomer compositions. As such, a skilled artisan would certainly not be motivated, after a reading of *Yamamoto*, to prepare Applicants' polyimide resins which are not crosslinked. At least for these reasons, Applicants respectfully request that this rejection be withdrawn and that claims 15-17, 23 and 26 be found to be in condition for allowance.

New claims 28-40 recite a polyimide binder resin that comprises a tetracarboxylic acid component and an aromatic diamine component with the requirement that the binder resin is not crosslinked. This requirement clearly distinguishes Applicants' claimed invention from the highly crosslinked oligomers described by *Yamamoto*. Because *Yamamoto* does not teach or suggest non-crosslinked oligomer compositions, these new claims are also both novel and nonobvious in view of *Yamamoto* for at least this reason.

3. Rejection Under 35 U.S.C. § 103(a): Yamamoto in view of Hashimoto

The Examiner also maintains her rejection of claims 18-22, 24, 25 and 27 under 35 U.S.C. § 103(a) as being unpatentable over *Yamamoto* in view of U.S. Published Application No. 2002/0106521 to Hashimoto *et al.* ("*Hashimoto*"). According to the Examiner, *Yamamoto* fails to teach that the described terminal-modified imide composition solution impregnated into the reinforcing fiber comprises 1,2-dimethylimidazole and/or 1-methyl-2-ethylimidazole. Further, the Examiner states that while *Yamamoto* teaches that the terminal-modified imide oligomer composition can be adhered to a metallic foil, it fails to teach that the metallic foil can be copper. The Examiner asserts that *Hashimoto* teaches that the described resin composition may contain a reaction promoter for use during drying or heat curing that includes 1,2-dimethylimidazole or 1-methyl-2-ethylimidazole. In addition, the Examiner asserts that *Hashimoto* teaches that a copper film can be applied to the described resin's surface. It is the Examiner's contention that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use these particular reaction promoters in the terminal-modified imide composition solution described in *Yamamoto*. The Examiner provides an analogous statement regarding the

obviousness of using the copper foil described in *Hashimoto* as the metallic foil described in *Yamamoto*.

As discussed in section 2 above, *Yamamoto* does not teach or suggest Applicants' claimed polyimide resins because, at the very least, Applicants' claimed resins are not crosslinked and all of the oligomer compositions described by *Yamamoto* are highly crosslinked. *Hashimoto* cannot correct these deficiencies in *Yamamoto*. Therefore, the combination of *Yamamoto* with *Hashimoto* does not render Applicants' claims anticipated or obvious.

In the previously filed response, Applicants argued that *Hashimoto* teaches the use of 1,2-dimethylimidazole or 1-methyl-2-ethylimidazoles strictly as "promoting a reaction during drying or curing under heat" (page 7, paragraph [0062]). In contrast, these compounds are used by Applicants to make the described polyimide precursor water-soluble. Thus, a person of ordinary skill in the art would not be motivated, after a reading of *Hashimoto*, to use either of these two curing promoters as agents for inducing water-solubility in a polyimide precursor.

The Examiner responded to this argument by asserting that the function or purpose of the 1,2-dimethylimidazole or 1-methyl-2-ethylimidazoles is irrelevant in a product claim. Applicants respectfully disagree. Because *Hashimoto* is a secondary reference in an obviousness rejection based on a combination of references, the motivation to combine the primary reference with the secondary reference is pertinent in addressing the appropriateness of the rejection. The only function of the two above-identified imidazole derivatives in *Hashimoto* appears to be their reaction promoter properties. Therefore, a skilled artisan would not be motivated to use them in preparing a composition where increased water-solubility is the objective.

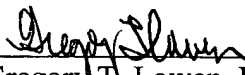
4. Conclusion

Upon consideration of the foregoing, it will be recognized that Applicants have fully and appropriately responded to all of the Examiner's rejections. Accordingly, all claims are believed to be in proper form in all respects and a favorable action on the merits is respectfully requested. Should the Examiner feel that there are any issues outstanding after consideration of this amendment, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or to credit any overpayment to Deposit Account 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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Dated: February 28, 2005

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